PATENT SPECIFICATION

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COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Condenser for Solvent Vapours

WE, MAX BÖHLER AND FERDINAND WEBER, of Memminger Strasse 6-7, Augsburg, Germany, both of German nationality, trading as Böhler & Weber K.G. Machinenfabrik, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement :—

The invention relates to condensers for solvent vapours.

When using chlorinated hydrocarbon solvents for chemical cleaning, particularly with respect to cabinets already installed, it is necessary to distill the solvents either intermittently or continuously in order to free the solvent from its soluble or insoluble impurities.

The distillation device, which is part of the whole apparatus, should require as little space as possible, should be adapted to be operated in the simplest manner, should be reliable and economic in operation and as corrosion-resistant as possible.

The distillation apparatus consists essentially of a heating vessel, which may be of any suitable construction, and which may be heated by steam or by electricity. The heating vessel is connected to the condenser by a bent tube through which the solvent vapours pass to the condenser. The condensate then flows into a water separator in which the pure solvent recovered is separated from the distilled water.

The invention has among its objects to improve the distilling system, particularly with respect to condensers. It relates particularly to a condenser for chemical cleaning plants for the recovery of solvent, in which inside the housing a pipe system is provided through which the cooling medium flows.

In known condensers of this kind, the cooling system is generally provided within a construction which also houses the heating vessel. Such condensers have, however, considerable disadvantages. As they are provided directly above the heating vessel, the pipes must extend over the whole periphery of the upper part of the heating vessel, which necessitates providing pipes of considerable length.

Due to the fact that the solvent vapour condenses uniformly over the entire surface of the pipe, a satisfactory countercurrent cooling water utilisation is not possible and the condensate cannot be satisfactorily after-cooled.

The formation of scum and the wrong servicing of the heating vessel by overfilling it, results in the danger of contaminating the distillate. Impurities, can easily accumulate between the cooling ribs.

According to the invention the condenser is provided with a syphon. The syphon is preferably long enough to extend beyond the lower condenser tubes. The level of overflow of the syphon is therefore adjusted so that one part of the surface of the condenser tube is continuously immersed in the condensate. Thus ensures good countercurrent cooling water utilisation and a maximum after-cooling of the condensate.

A further feature of the invention is that a ventilation opening is provided in the upper curve of the syphon. This opening, which ventilates the condenser housing, prevents discharge of the condensate into the condenser and ensures uniform escape of the condensate.

In a preferred embodiment of the construction according to the invention, the open end of the syphon in the condenser is provided at a small distance above the bottom. At the start of distillation, air is expelled from the heating vessel, which air

presses against the liquid level of the condensate, which has remained in the condenser after previous distillation, and drives it out through the syphon. The syphon thus effects suction and sucks-in the dirt accumulated at the bottom of the condenser. Thus any clogging and fouling of the condenser is prevented. As soon as the syphon opening projects from the solvent and the air is driven out, normal operation can be started again.

According to the invention furthermore, the condenser tube or cooling pipe is provided with cooling ribs extending parallel to the direction of dripping. This effects self-cleaning of the surface as the condensate drips downwardly. To protect the condenser pipe system against any attack of acids, which have been freed during the distillation process, a known corrosion-protective coating is provided. The invention furthermore affords the possibility of quickly exchanging the pipe system, due to the fact that it is detachably connected to the housing and that the housing is provided with a lid the size of which is at least the size of the pipe system.

The construction according to the invention thus provides a condenser of simple, robust construction which, in view of the satisfactory after-cooling of the condensate, provides for self-cleaning and thus for high efficiency and reliability.

The invention is diagrammatically illustrated by way of example in the accompanying drawing, which shows a section through a condenser for chemical cleaning apparatus according to the invention.

In a simply manufactured housing 1 of approximately cylindrical form, which is provided with a readily closable lid or cover 2, a condenser helix or tube 3 consisting of a ribbed pipe is provided, through which the cooling water flows. The cooling water enters the pipe system through pipe connection 4 at the bottom of the housing and leaves it through pipe connection 5 provided at the upper end of the container. The cooling ribs 6 are disposed at right angles to the axis of the condenser tube 7. The solvent vapour enters the condenser through a vapour inlet pipe 8 of enlarged cross-section.

The condensate dripping from the condenser helix or tube 3 accumulates at the bottom of the housing, where a condenser outlet in the form of a symbol 9 is provided, the level of overflow of which is so adjusted that approximately 1/4 to 1/3 of the entire surface of the cooling helix or tube is continuously immersed, so that a maximum after-cooling of the condensate may be effected. A ventilation opening 10 in the upper curve of the syphon 9 enables uniform discharge of the condensate. The open end 11 of the syphon is located at a small distance 12 above the bottom of the condenser, so that at the start of a fresh distillation, the suction hereinbefore described is effected.

If the lid or cover 2, which is connected to the housing by, for example, screws or the like, is removed, then the condenser helix or tube 3, after disconnection from the pipe connections 4 and 5, may be readily withdrawn. The surface of the pipe and the inner surface of the housing are provided with a corrosion-preventive coating.

WHAT WE CLAIM IS :—

1. A condenser, for solvent vapours particularly the solvent vapours from chemical cleaning plants, for the recovery of the solvent, in which a pipe system, through which the cooling medium flows, is provided inside the condenser housing, and in which the outlet for the condensate is in the form of a syphon inside the condenser housing.

2. A condenser according to claim 1, in which the syphon is of a height so as to extend beyond the lower condenser tubes.

3. A condenser according to claims 1 and 2, in which a ventilation opening is provided in the upper curve of the syphon.

4. A condenser according to any of claims 1 to 3, in which the open end of the syphon is disposed at a small distance above the bottom of the condenser.

5. A condenser according to any of claims 1 to 4, provided with a cooling pipe system having cooling ribs which are disposed at right angles to the axis of the condenser tube.

6. A condenser according to any of the preceding claims, in which the condenser pipe system is provided with a corrosion-preventive coating.

7. A condenser according to any of the preceding claims, in which the circumference and the diameter of the lid for the housing or the aperture of the housing are at least the same as the circumference and diameter of the pipe system disposed underneath.

8. A condenser for solvent vapours, substantially as hereinbefore described and illustrated in the accompanying drawing.

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1 SHEET

This drawing is a reproduction of the Original on a reduced scale.